

REMARKS

The Examiner is thanked for the thorough examination of the present application. The Office Action, however, tentatively rejected all claims 1-27. Claims 1, 4, 10, and 24 have been amended. Claims 5-9, 11-23 and 27 remain in this application. Claims 2-3 and 25-26 have been canceled, and claims 28-31 have been added.

Applicant has amended claim 1 to incorporate the subject matter of original claim 3, to more clearly identify a novel and non-obvious feature of the claimed embodiments. Specifically, the phrase “the size of each microlens increasing as the distance between the microlens to a chip center” is added to claim 1. Support for this limitation can be found at least on page 7, lines 16-17 of the application. Accordingly, no new matter has been added by this amendment. Applicant has amended claim 4 to change its dependence from claim 3 (now canceled) to claim 1.

Applicant has amended original 10 to more clearly identify a novel and non-obvious feature of the claimed embodiments. Specifically, the phrase “the sizes of the microlenses in different region increase as the distance between the corresponding region and the chip center” is added to claim 10. Support this limitation can be found at least on from page 7, line 21 to page 8, line 8 and original Fig. 4 (previously amended to Fig.4A) of the application. Those skilled in the art can clearly identify this feature in the descriptions on page 7, lines 21-25 with the subsequent description and original Fig. 4 (amended Fig.4A). Accordingly, this amendment adds no new matter to the application.

Applicant amended claim 24 to incorporate the subject matter of claim 26, to more clearly identify a novel and non-obvious feature of the claimed embodiments. Specifically, the phrase “the size of each microlens increasing as the distance between the microlens to a chip

center” is added to claim 24. Support for this limitation can be found at least on page 7, lines 16-17 of the application. Accordingly, the amendment adds no new matter to the application.

Applicant has added new claims 28 and 30 to define a novel and non-obvious feature of the claimed embodiments. Specifically, claims 28 and 30 recite the phrase “the chip (semiconductor substrate) comprises a chip center, and further comprises a first region of a round area from the chip center to a radius r_1 , and a second region of an annular area encircling the region A_1 from the radius r_1 to the radius r_2 greater than r_1 ; and the microlenses disposed in the first and second regions have a constant size S_1 and S_2 respectively, wherein $S_1 < S_2$ ”. Support this feature can be found at least on page 7, lines 25-29, page 8, lines 1-8, and original Fig. 4 (amended Fig. 4A) of the application. Accordingly, this amendment adds no new matter to the application.

Applicant has added new claims 29 and 31 to more clearly identify a novel and non-obvious feature of the claimed embodiments. Specifically, claims 29 and 31 recite the phrase “the chip (semiconductor substrate) comprises a chip center, and further comprises a first region of a round area from the chip center to a radius r_1 , a second region of an annular area encircling the region A_1 from the radius r_1 to the radius r_2 greater than r_1 , and a third region of a ringlike region encircling the region A_2 from the radius r_2 to the edge of the semiconductor substrate; and the microlenses disposed in the first, second, and third regions have a constant size S_1 , S_2 and S_3 respectively, wherein $S_1 < S_2 < S_3$ ”. Support this feature can be found at least on page 7, lines 25-29, page 8, lines 1-8, and original Fig. 4 (amended Fig. 4A) of the application. Accordingly, the amendment adds no new matter to the application.

35 U.S.C. 102(b)

Claims 1-27 stand rejected under 35 U.S.C 102(b) as allegedly anticipated by Summa (US 2002/0140832). Applicant respectfully traverses the rejections for at least the reasons discussed below.

Independent claims 1 and 24, as amended, recite the phrase “the size of each microlens increasing as the distance between the microlens to a chip center”. This unique feature serves to balance the brightness on different regions of a chip. (See page 7, lines 8-17 of the specification).

In contrast, Summa teaches the lenses 30a over the blue-colored filters 20a are significantly larger than the lenses over other colors, and the lenses 30b over the red colored filters are significantly larger than the lenses 30c over the green color filters 20c. Thus, Summa teaches the lenses 30 are varied in size as the color of the underlying color filters, but NOT as the distance between the microlens to a chip center, as claimed by claims 1 and 24.

In Fig. 2 of Summa, indeed, when the position where the left lens 30c disposed acts as a “center”, the lens 30a at the right side thereof is larger than the left lens 30c. When the distance to the left lens 30c goes further, however, the size of the right lens 30c, equal to that of the right lens 30c, decreases as compared to the size of the lens 30a. Consequently, Summa fails to disclose “the size of each microlens increasing as the distance between the microlens to a chip center” of the claimed embodiment.

For at least this reason, claims 1 and 24 are allowable over the cited references. Insofar as claims 4-10 and 27 depend from claims 1 and 24, these claims are also allowable.

Claims 12 and 20 recite “each microlens overlying its corresponding color filter unit without overlying adjacent regions thereof”. This unique feature serves to avoid cross-talk. (See

page 10, lines 20-22 of the specification).

In contrast, Summa teaches the lenses 30a over the blue-colored filters 20a, however, the lenses 30a further overlies the adjacent green color filters 20c. See Fig. 2 of Summa.

Consequently, Summa fails to disclose “each microlens overlying its corresponding color filter unit without overlying adjacent regions thereof” of the claimed embodiments.

For at least this reason, independent claims 12 and 20 are allowable over the cited references. Insofar as claims 13-18, 21-23 depend from claims 12 and 20, these claims are also allowable.

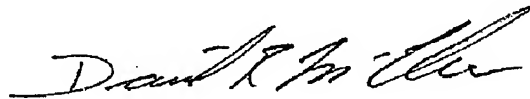
New Claims

Claims 28-31 have been newly added to emphasize the lens arrangement of the claimed embodiments. There is no cited reference disclosing such an arrangement and achieving such an unexpected result. Therefore, beside their dependency from the independent claims 1 and 24, claims 28-31 should be allowable.

Accordingly, all pending claims are in condition for allowance.

Although four claims have been added, four claims have been canceled, so no additional claim fee is due. Indeed, no fee is believed to be due in connection with this amendment and response. If, however, any fee is deemed to be payable, you are hereby authorized to charge any such fee to Deposit Account No. 20-0778.

Respectfully submitted,



Daniel R. McClure
Registration No. 38,962

THOMAS, KAYDEN, HORSTEMEYER & RISLEY, L.L.P.
Suite 1750
100 Galleria Parkway N.W.
Atlanta, Georgia 30339
(770) 933-9500